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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/789,696	02/27/2004	Stephen M. Potter	3566	9300

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EXAMINER

MCNELIS, KATHLEEN A

ART UNIT	PAPER NUMBER
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1742

DATE MAILED: 02/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/789,696

Applicant(s)

POTTER ET AL.

Examiner

Kathleen A. McNelis

Art Unit

1742

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 February 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 and 8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Claims Status

Claims 1-5 and 8 remain for examination. Claims 6 and 7 were canceled.

Acknowledgement of RCE

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(c), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.115, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 4, 2006 has been entered.

Status of Previous Rejection

The previous rejections of claims 1-5 and 8 under 35 U.S. C. 103(a) have been withdrawn in view of applicants' arguments. Examiner agrees that the temperature range cited in U.S. pat. No. 6,395,056 is likely a typographical error in that patent.

The previous provisional double patenting rejection of claims 6 and 7 is withdrawn in view of applicants' cancellation of the claims.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Villarreal-Trevino et al. (U.S. Pat. No. 6,395,056) in view of Zeller et al. (U.S. Pat. No. 6,336,954).

With respect to claims 1 and 2, Villarreal-Trevino et al. discloses a method for reducing iron oxide that includes a preheating step in a non-reducing (preferably oxidizing) atmosphere (abstract). Villarreal-Trevino et al. discloses that the invention applies to lumps of iron ore (col. 2 lines 66-67). Villarreal-Trevino et al. teaches that the reduction reaction of iron oxide from hematite to magnetite and accompanying change

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in crystalline structure weakens the ore lumps and pellets (col. 1 line 63- col. 2 line 5). Villarreal-Trevino et al teaches that the in prior art methods where ore is heated from ambient temperature to operating temperatures in reducing conditions, longer heating times resulted in greater weakening of the ore (col. 2 lines 5-19). An objective in the method of preheating as taught by Villarreal-Trevino et al. is to avoid the formation of fines (col. 2 lines 48-55).

Villarreal-Trevino et al. does not teach that the temperature range for preheating is from about 200 to 500 °C or that the temperature of the preheated feed material is increased to about 750 °C within the first 20 minutes of charging to the furnace.

Zeller et al. discloses a process for direct reduction of iron oxide containing material in a fluidized bed process, by preheating ores in a temperature range of preferably below 350 °C (abstract) and preferably above 250 °C (col. 4 lines 27-32). Zeller et al. teaches that the formation of magnetite during direct reduction inhibits direct reduction with a reducing gas (col. 1 lines 60-67). Zeller et al. teaches that the formation of magnetite is minimized by maintaining the preheating temperature below 400 °C (col. 2 lines 6-55) in non-reducing conditions (Fig. 9), then making the temperature adjustment from 400 to 580 °C within a maximum of 10 minutes and preferably 5 minutes from the time the ore enters the reducing zone (col. 2 lines 33-39). Zeller teaches that this temperature range is kinetically favored for magnetite formation (fig 10 and col. 2 lines 40-55). The process disclosed by Zeller et al. is for a fluidized bed process, which is not a shaft furnace as in instant claim 1 and Villarreal-Trevino et al. However, the processes of Zeller et al. and Villarreal-Trevino et al. are both gas based

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reduction processes for the direction reduction of iron ore and both disclose solutions for the same problem: avoiding magnetite formation during preheating of iron ore.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to preheat the feed material to in a range below 350 °C and above 250 °C as taught by Zeller et al. in the preheating process of Villarreal-Trevino et al. to minimize the formation of magnetite and thereby improve direct reduction as taught by Zeller et al. The range of below 350 °C and above 250 °C is within the claimed range of between about 200 to about 500°C (claim 1) and within the claimed range of about 200 to 425°C (claim 2).

Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made to rapidly pass through the temperature region of between 400 and 580°C in reducing conditions, exceeding 580°C within a maximum time of 10 minutes as taught by Zeller et al. in the direct reduction process of Villarreal-Trevino et al. to minimize the formation of magnetite and thereby improve direct reduction as taught by Zeller et al. The maximum heating time of 10 minutes is within the claimed time of within the first 20 minutes. The range of above 580 °C overlaps with the claimed range of about 750 °C. It would have been obvious to one of ordinary skill in the art at the time the invention was made to rapidly increase the temperature of ore to about 750 °C in the reduction process of Villarreal-Trevino et al. in view of Zeller et al., since Zeller et al. teaches the formation of magnetite is kinetically less favored at any temperature above 580 °C than it is within the range of 400 and 580°C.

Villarreal-Trevino et al. teaches that the effect of minimizing the phase transformation from hematite to magnetite preserves the strength of the crystalline structure (col. 2 lines 1-20) and minimizes fines formation (col. 2 lines 48-57).

With respect to claims 3 and 4: Villarreal-Trevino et al. teach that preheating is accomplished in a feed storage bin (hopper, Figure 1 and col. 4, lines 22-24). A hot non-reducing gas stream is provided by combustion of fuel and waste off-gases with air (Col 4, lines 25-32). While Villarreal-Trevino et al. are not explicit as to the temperature of the gas as it enters the pre-treatment chamber, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the heating gas at a temperature sufficient to reach the required preheating conditions as discussed above regarding claims 1 and 2.

With respect to claim 5: Villarreal-Trevino et al. teach a process option (Figure 5), which includes a reformer (69) to produce the reducing gas (col. 4, lines 12-34). The reducing gas is fed to the furnace (30), then waste off-gases are removed from and cooled in a heat exchanger (44), then either returned to the reformer, treated in another manner, or combusted as part of the fuel for the pretreatment system (Figure 5). The applicant's use of the phrase "associated with" is interpreted to mean anywhere in the system as opposed to directly connected to.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Villarreal-Trevino et al. (U.S. Pat. No. 6,395,056) in view of Zeller et al. (U.S. Pat. No. 6,336,954) and Weedon et al. (June 2000).

Villarreal-Trevino et al. in view of Zeller et al. discloses a pre-treatment method for reducing solid lump feed material in a gas based shaft furnace by preheating lump feed material to a temperature from between 250 and 350 °C in a non-oxidizing atmosphere then increasing the temperature of the preheated feed to about 750 °C during the first 10 minutes in the reducing furnace whereby the formation of fines is minimized as discussed above regarding claims 1 and 2.

Villarreal-Trevino et al. in view of Zeller et al. does not disclose that the heating to 750 °C occurs while the feed material descends the first half-meter in the furnace.

Weedon et al. discloses results of modeling iron ore degradation (abstract) wherein the results of previous testing is summarized. Weedon et al. teaches that previous testing shows that the longer distance ore falls the greater the percentage of fines produced, with falls of 1 m or less reducing the amount fines formation (p. 197). It would have been obvious to one of ordinary skill in the art at the time the invention was made to reduce the height of ore drop to 1 m or less as taught by Weedon et al. into the reducing furnace of Villarreal-Trevino et al. in view of Zeller et al. to minimize the amount of fines formed by the drop as taught by Weedon et al. The range of 1 m or less overlaps with the claimed range of $\frac{1}{2}$ meter. It would have been obvious to one of ordinary skill in the art at the time the invention was made to reduce the drop to within $\frac{1}{2}$ meter since Weedon et al. teaches that smaller drops generally result in less formation of fines. By minimizing the drop distance, the generation of fines from ores will be reduced in the furnace of Villarreal-Trevino et al. in view of Zeller et al. and the ore will also reach operating temperature within the first $\frac{1}{2}$ meter of descent into the furnace.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kathleen A. McNelis whose telephone number is 571-272-3554. The examiner can normally be reached on M-F 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ROY KING
SUPERVISORY PATENT EXAMINER
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